Decoding Neural Responses to Partly Occluded Objects in 6-Month-Old Infants

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Behavioural evidence suggests that infants develop expectations about the physical world early in life, demonstrating an ability to perceive partly hidden objects as unified entities early in infancy. However, little is known about the neural basis of infants' object perception under occluded conditions – specifically, whether partially-hidden objects evoke similar neural responses to their unoccluded counterparts. We investigated this using time-resolved multivariate pattern analysis of EEG data recorded in six-month-old infants as they viewed images of four distinct objects (bear, penguin, rocket, tower) that varied in terms of colour (pink vs. blue), retinal size (~8^{o} vs. ~13^{o}), and occlusion level (unoccluded vs. partially occluded). The occluders were fixed-size rectangles containing a Gabor stimulus of either high or low spatial frequency, positioned to occlude either the left or right half of each object. This fully-crossed design allowed us to examine visual representations at multiple levels: from low-level features such as occluder position, to higher-level representations of object identity and category. Preliminary results suggest that infants' neural responses encoded information about both object and occluder characteristics. Of particular interest is whether neural representations of object identity and/or category are maintained across changes in occlusion, which, if observed, would provide some of the first neural evidence for occlusion-invariant object processing in the infant brain, and offer new insights into the developmental trajectory of object vision in the first year of life.